FISH PHYSIOLOGY PUT INTO PRACTICE: A ROBOTIC FISH MODEL

Underwater robot design based on the mechanism of fish locomotion

Claudio Rossi, William Coral, Antonio Barrientos. Julian Colorado
Center for Robotics and Automation
Universidad Politécnica de Madrid + CSIC, Spain

Motivation

- Underwater creatures are capable of high performance movements in water
- Researches have been developing underwater robots based on underwater creatures swimming mechanism. Yet, most of them have little resemblance with real fish physiology.

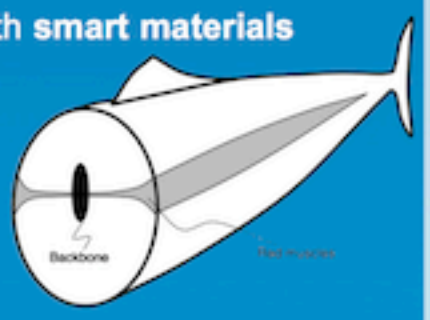
Objectives

- We aim at designing bio-inspired motor-less and gear-less robots
- Achieve locomotion efficiency and maneuverability of swimming creatures
- In this work, the focus is on locomotion

The model is made of a bendable structure (**backbone**)

Segments are actuated by two antagonist muscles made with **smart materials** technology, Shape Memory Alloys (SMAs).

Actuators imitate **red muscles** (steady swimming)



Advantages:
- simplicity,
- extremely light weight
- practically null volume of the actuators, (more available payload)

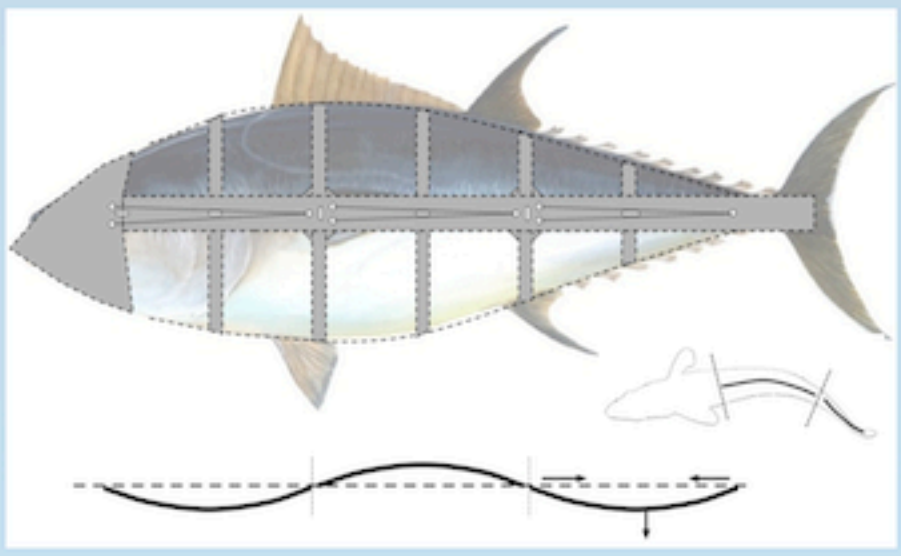
✓ The actuators are absolutely **silent**
✓ They do not produce **any vibration**

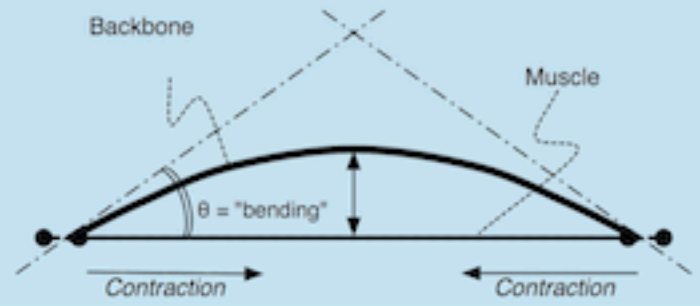
▸Such a feature which can be exploited, e.g. in the observation of sea wild life since the robot would not disturb in any way

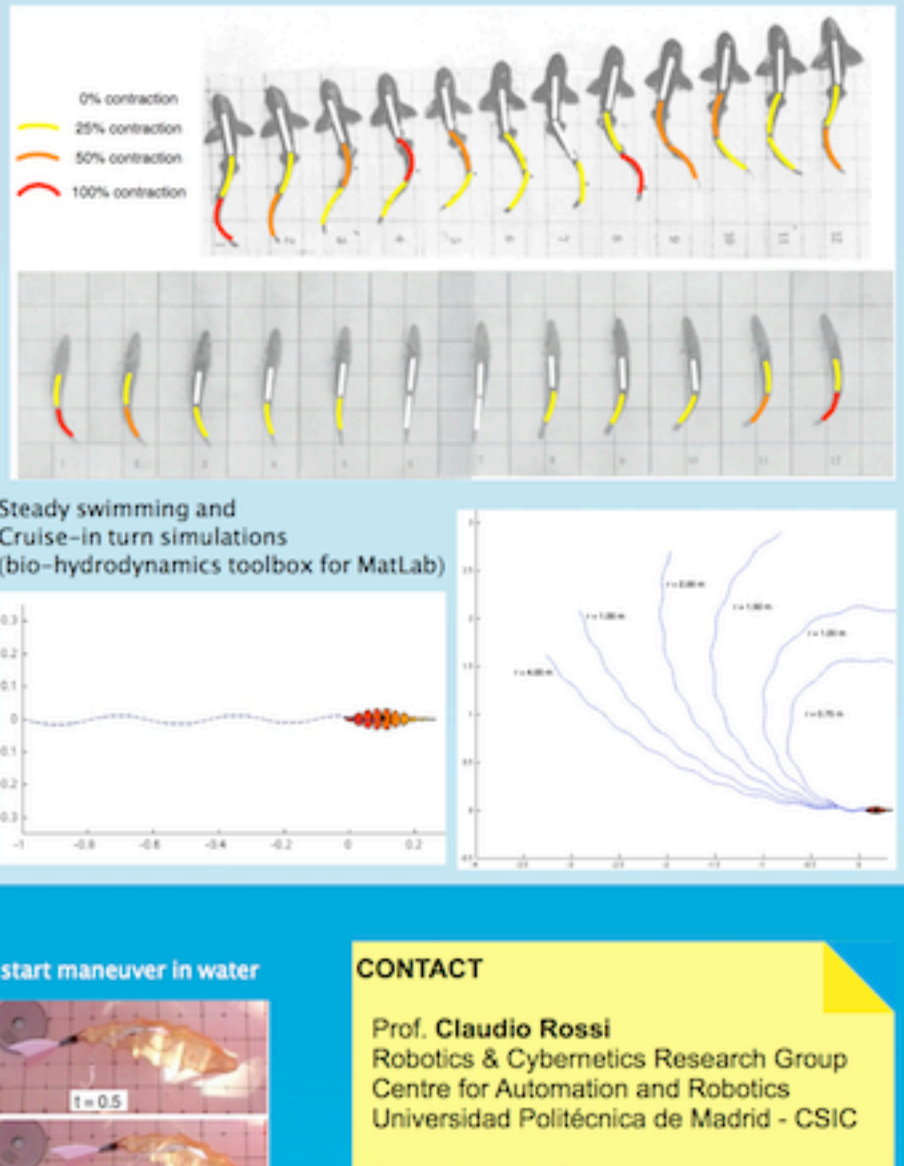
The model can be used for testing and comparison of different motion patterns, validate hypothesis and also for didactical purposes.

iTuna V1

3 segments, total length: 30 cm + caudal fin
- Segment 1: head (used for turning maneuvers)
- Segments 2 and 3: (sub)carangiform swimming

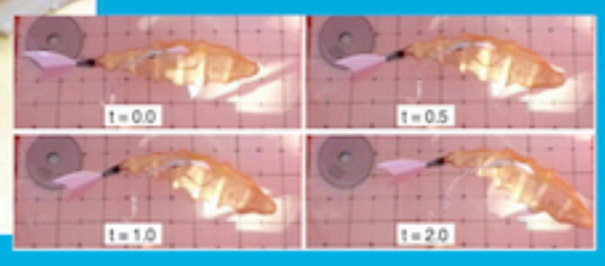






Steady swimming and
Cruise-in turn simulations
(bio-hydrodynamics toolbox for MatLab)

C-start maneuver in water



CONTACT

Prof. **Claudio Rossi**
Robotics & Cybernetics Research Group
Centre for Automation and Robotics
Universidad Politécnica de Madrid - CSIC

Claudio.Rossi@upm.es
http://robcib.etsii.upm.es

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